Key

Math 100 Review on Radicals and Rational Exponents

I. Evaluate.

(1) $(-27)^{-2/3}$

$\left(-\frac{1}{27}\right)^{2/3} = \left(\sqrt[3]{-\frac{1}{27}}\right)^2 = \left(-\frac{1}{3}\right)^2 = \boxed{\frac{1}{9}}$

(2) $8^{1/3} \cdot 8^{-2/3}$

$8^{-\frac{1}{3}} = \left(\frac{1}{8}\right)^{\frac{1}{3}} = \sqrt[3]{\frac{1}{8}} = \boxed{\frac{1}{2}}$

II. Use the rules of exponents to simplify. Write answers with positive exponents only.

(3) $\left(9x^6y^2\right)^{1/2}$

$\boxed{3x^3y}$

(4) $\left(\frac{a^{-1/2}}{b^{-1/4}}\right)^{-4}$

$\boxed{\frac{a^2}{b}}$

(5) $\left(a^{1/2}b\right)^{1/2}\left(ab^{1/2}\right)$

$(a^{\frac{1}{4}}b^{-\frac{1}{2}})(ab^{\frac{1}{2}})$

$\boxed{a^{\frac{5}{4}}b}$

III. Simplify each radical expression.

(6) $\sqrt[4]{-81}$

Not a Real #

(7) $\sqrt[3]{-48x}$

$-8 \cdot 6$

$\boxed{-2\sqrt[3]{6x}}$

(8) $\frac{\sqrt{3}}{\sqrt{7}}$

$\boxed{\frac{\sqrt{21}}{7}}$

(9) $\frac{1}{\sqrt[3]{3}}$

$\boxed{\frac{\sqrt[3]{9}}{3}}$

(10) $\left(2\sqrt{5}+\sqrt{2}\right)\left(3\sqrt{5}-\sqrt{2}\right)$

$30 - 2\sqrt{10} + 3\sqrt{10} - 2$

$\boxed{28+\sqrt{10}}$

(11) $\sqrt{50a}+\sqrt{18a}-\sqrt{2a}$

$5\sqrt{2a} + 3\sqrt{2a} - \sqrt{2a}$

$\boxed{7\sqrt{2a}}$

(12) $\sqrt{63a^{15}b^7}$

$9 \cdot 7\, a^{14} a\, b^6 \cdot b$

$\boxed{3a^7b^3\sqrt{7ab}}$

(13) $\sqrt[3]{2}\left(\sqrt[3]{12x}-\sqrt[3]{2x}\right)$

$\sqrt[3]{24x} - \sqrt[3]{4x}$

$\times 3$

$\boxed{2\sqrt[3]{3x} - \sqrt[3]{4x}}$

(14) $\left(3\sqrt{a}+2\right)^2$

$\boxed{9a + 12\sqrt{a} + 4}$

(15) $\frac{2-\sqrt{3}}{\sqrt{2}+\sqrt{6}} \cdot \frac{\sqrt{2}-\sqrt{6}}{\sqrt{2}-\sqrt{6}}$

$\frac{2\sqrt{2} - 2\sqrt{6} - \sqrt{6} + 3\sqrt{2}}{2 - 6} = \boxed{\frac{5\sqrt{2} - 3\sqrt{6}}{-4}}$

(16) $\frac{8-\sqrt{32}}{20}$

$\frac{4(2-\sqrt{2})}{20}$

$\frac{8-4\sqrt{2}}{20}$

$\boxed{\frac{2-\sqrt{2}}{5}}$

(17) $\left(2\sqrt{2}\right) \div \left(4\sqrt{10}\right)$

$\frac{2\sqrt{2}}{4\sqrt{10}} = \frac{1}{2\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \boxed{\frac{\sqrt{5}}{10}}$

IV. Write as a single radical expression.

(18) $\sqrt{3} \cdot \sqrt[4]{3}$

$3^{\frac{1}{2}} \cdot 3^{\frac{1}{4}}$

$3^{\frac{3}{4}} = \boxed{\sqrt[4]{27}}$